DRAINAGE STUDY
LAS MANSIONES DE BONITA

County of San Diego

PREPARED BY:
STUART ENGINEERING
7525 METROPOLITAN DRIVE, SUITE 308
SAN DIEGO, CA 92108
JOB NO. 312-07-04
BRIAN FARACI, RCE 34618

September 7, 2007

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INTRODUCTION

This project proposes to subdivide two existing legal lots into five residential lots on a 5.32 acre site. The proposed Las Mansiones de Bonita is located on the northern side of Sweetwater Road where it intersects Tennis Court Lane, in the unincorporated area of Bonita, in the County of San Diego (see Vicinity Map).

To the south of the site is Sweetwater Road. To the north, east, and west of the site are existing residences. Traveling through the site, in the north-south direction, is the private road Tennis Court Lane.

DRAINAGE/HYDROLOGY DESIGN CRITERIA

San Diego County Hydrology Manual requires that runoff calculations for drainage upstream of any major roadway is to be calculated based on 50-year storm events while drainage at a major roadway, crossing the major roadway and thereafter is to be calculated based on 100-year storm events. (See Section 2.3 of County of San Diego Hydrology Manual dated June 2003 in Appendix 7).

This project is in the San Diego Region, Sweetwater Hydrologic Unit, Lower Sweetwater Hydrologic Area, and La Nacion Hydrologic Subarea 909.12 according to the Regional Water Quality Control Board map displaying the San Diego Hydrologic Basin Planning Area. Currently, the majority of the existing drainage flows onto Sweetwater Road and eventually flows into the San Diego Bay.

The soil group for the project is Soil Group D which has the properties of a very slow infiltration rate. This soil group was used for both existing conditions and proposed conditions.

Stuart Engineering conducted the calculations for 50-year and 100-year storm events using Advanced Engineering Software (AES).

EXISTING DRAINAGE

Currently most of the site has hard soil; therefore the soil group for the project is estimated to be Soil Group D, which has the properties of a very slow infiltration rate. It was estimated that 25% of the site was impervious giving a runoff coefficient of 0.49, per Table 3-1 of the San Diego County Hydrology Manual, dated June 2003.

Currently the northwest corner of the site, approximated to be 0.33 acres, flows offsite to the neighboring property at a rate of 1.02 cfs during a 50 year storm event and 1.09 cfs during a 100 year event. Two separate areas on the west edge of the site also flow onto neighboring properties. The northernmost area estimated to be 0.19 acres in size flows at a rate of 0.38 cfs during a 50 year storm event and 0.41 cfs during a 100 year event. The southerly area estimated to be 0.13 acres in size flows at a rate of 0.32 cfs during a 50 year storm event and 0.34 during a 100 year event.

The remaining site flows to the southernmost corners of the site. Approximately 2.21 acres flow at a rate of 6.34 cfs during a 50 year storm event and 6.83 cfs during a 100 year event to the southwest corner, eventually flowing onto Sweetwater Road. The remaining 3.15 acres (including offsite drainage from adjacent properties to the northeast) flow at a rate of 7.89 cfs during a 50 year storm event and 8.51 cfs during a 100 year event to the southeast corner of the site, eventually flowing onto Sweetwater Road.

DURING CONSTRUCTION DRAINAGE

Currently there is grading being done on the westerly portion of the site for construction of a residence (see grading plans L-15115). For the purpose of construction, two desiltation basins are being installed on the west side of the site. Also, two type "A" curb outlets are being constructed on the southwest corner of the site. For more information regarding these desiltation basins and curb outlets, see approved Drainage Study prepared by Stuart Engineering on June 7, 2006 for grading plans L-15115.

PROPOSED DRAINAGE

The soil group for the project is Soil Group D which has the properties of a very slow infiltration rate. It was estimated that 20% of the proposed site will be impervious; therefore giving a runoff coefficient of 0.46, per Table 3-1 of the San Diego County Hydrology Manual, dated June 2003.

To determine runoff created by development, Stuart Engineering conducted a rational method hydrology study using AES software. The majority of the developed site will drain to the south ends of the site, eventually flowing onto the aforementioned Sweetwater Road.

The results for the 50 and 100-year storm events show that the developed site will produce less runoff than its existing conditions. The proposed site drains to three separate areas.

The northwest corner of the site, totaling 0.21 acres in size, flows at a rate of 0.66 cfs during a 50 year storm event and 0.71 cfs during a 100 year event onto the adjacent property. This is a decrease of 0.36 cfs (50 year) and 0.38 cfs (100 year) from the existing conditions.

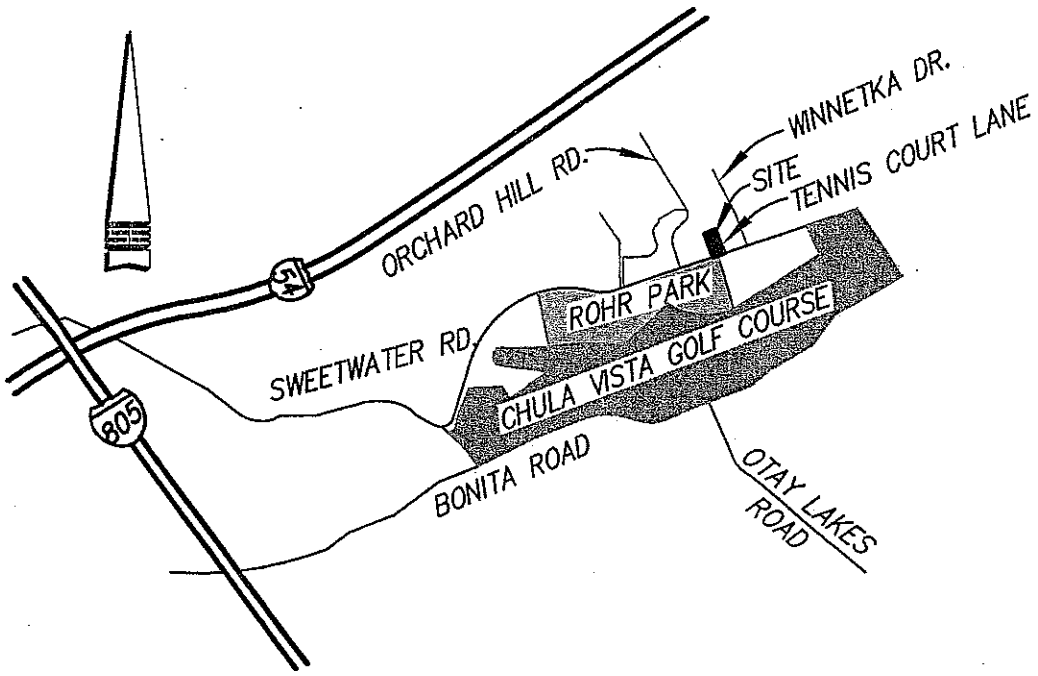
The remaining site drains to the southwest and southeast corners of the site, eventually flowing onto Sweetwater Road. The storm water enters a private storm drain system on-site and flows onto Sweetwater Road via D-25 curb outlets. The western portion of the site flows at a rate of 6.16 cfs during a 50 year storm event and 6.64 cfs during a 100 year event to the southwest corner of the site. This is a decrease of 0.18 cfs (50 year) and 0.19 cfs (100 year) from the existing conditions. The eastern portion of the site flows at a rate of 7.35 cfs during a 50 year storm event and 7.92 cfs during a 100 year event to the southeast corner of the site, a decrease of 0.54 cfs (50 year) and 0.59 cfs (100 year).

CONCLUSION

By the nature of the design, Las Mansiones de Bonita will have a decrease in runoff. Also by design, the runoff continues to flow to the same offsite locations; therefore no adverse impacts are anticipated from the proposed project due to the volume and direction of the runoff.

APPENDIX 1

VICINITY MAP



VICINITY MAP

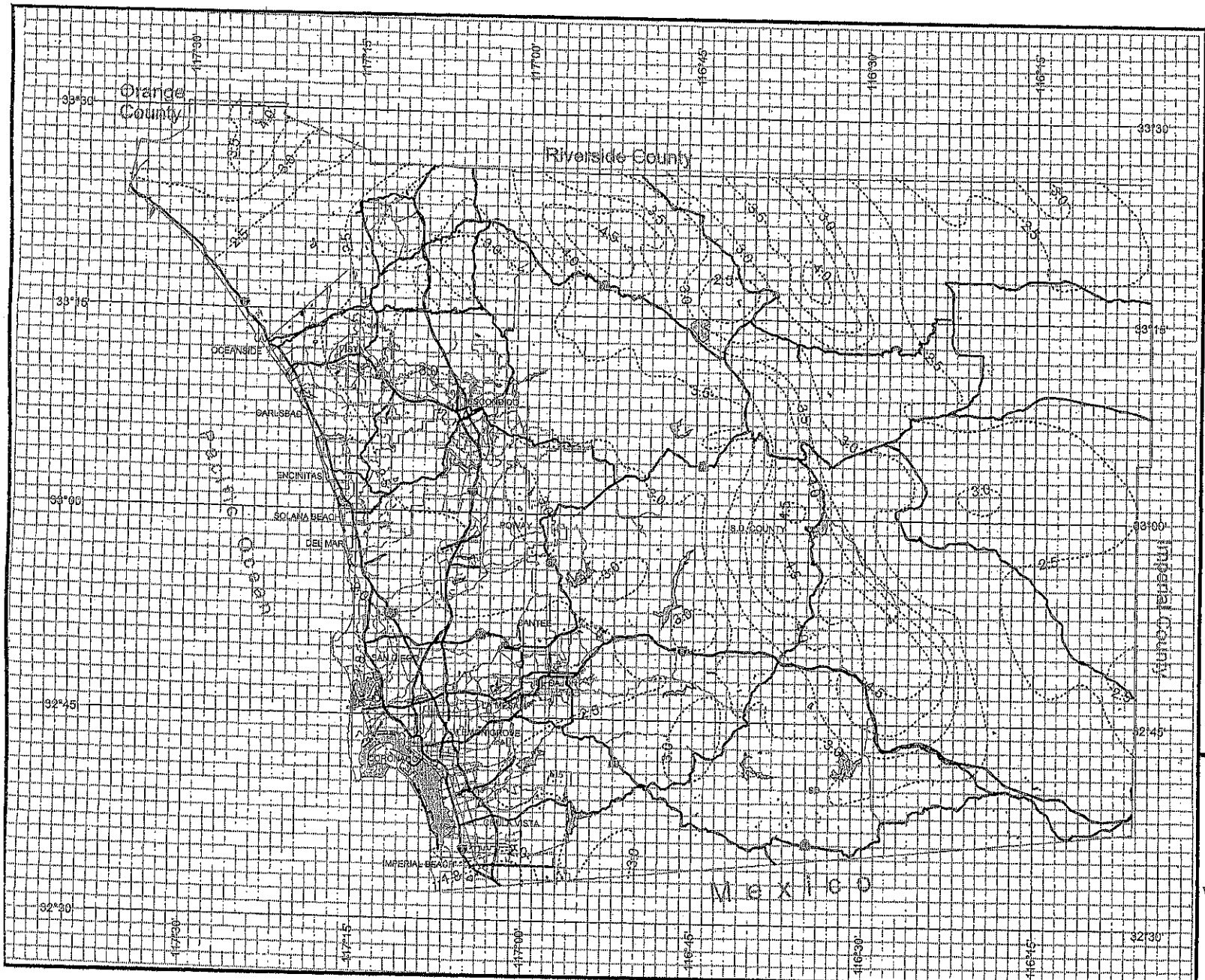
NO SCALE

APPENDIX 2

ISOPLUVIAL MAPS

2a

50 YEAR RAINFALL EVENT



County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works Geographic Information Services

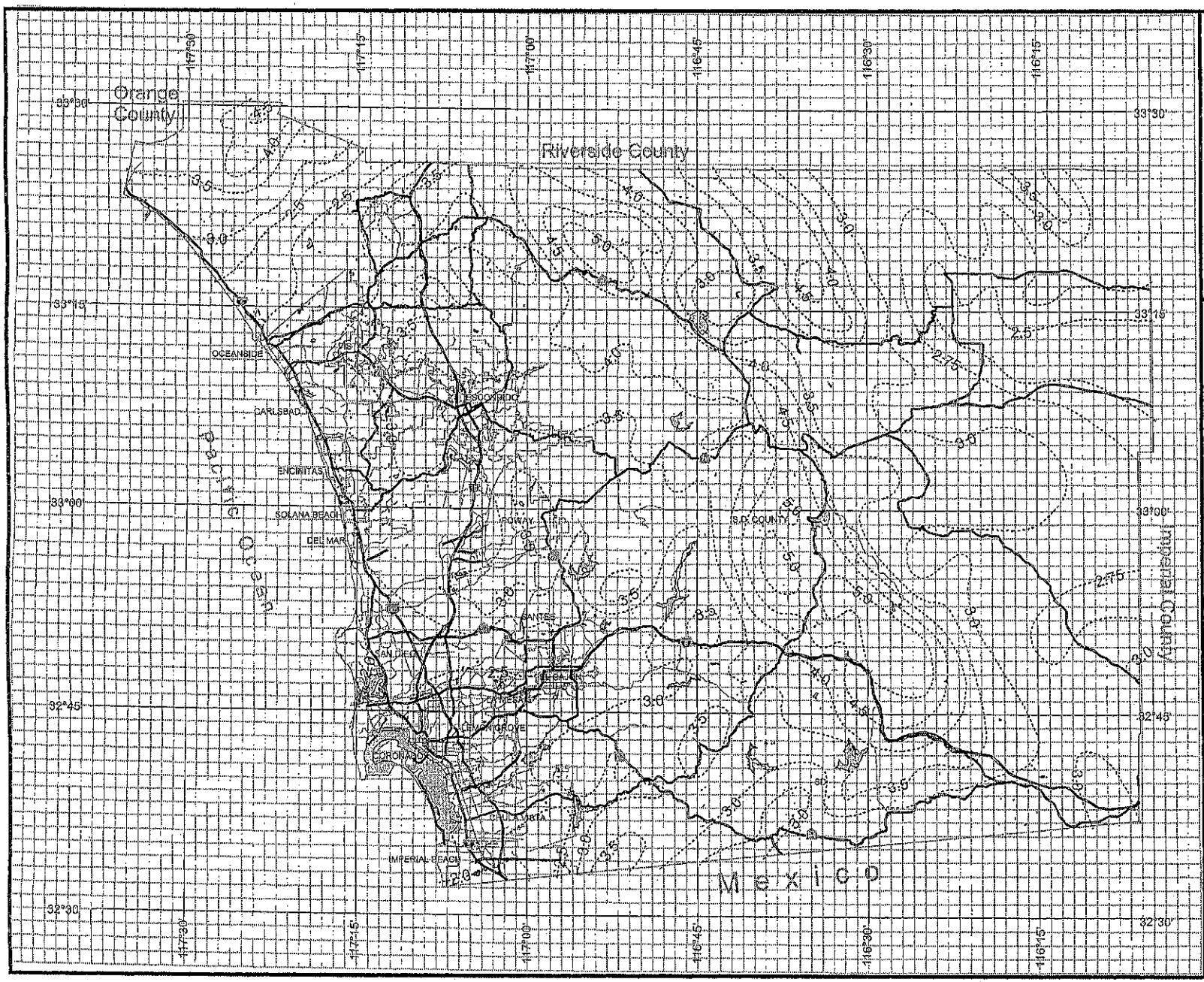
SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

2b

100 YEAR RAINFALL EVENT



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Departments of Public Works
Geographic Information Systems

SanGIS
We Have San Diego Covered!

N
W E
S

3 0 3 Miles

APPENDIX 3

AES PRINTOUTS

3a

50-YEAR STORM EVENTS
EXISTING CONDITIONS

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          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-2006 Advanced Engineering Software (aes)
           Ver. 2.0 Release Date: 06/01/2005  License ID 1402

                          Analysis prepared by:


 ************************** DESCRIPTION OF STUDY **************************
* LAS MANSIONES DE BONITA     JOB # 312-07-04                              *
* 50 YEAR ANALYSIS - EXISTING CONDITIONS                                   *
* PREPARED BY MIKE REMENSPERGER  9/6/07                                    *
 **************************************************************************

  FILE NAME: F:\ACAD\312\AES\312HYD1.DAT
  TIME/DATE OF STUDY: 13:51 09/07/2007
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**********************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    94.00
  UPSTREAM ELEVATION(FEET) =    131.90
  DOWNSTREAM ELEVATION(FEET) =    115.00
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 ELEVATION DIFFERENCE(FEET) =     16.90
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.185
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.692
 SUBAREA RUNOFF(CFS) =      1.02
 TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      1.02

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   164.00
 UPSTREAM ELEVATION(FEET) =    131.00
 DOWNSTREAM ELEVATION(FEET) =    129.90
 ELEVATION DIFFERENCE(FEET) =      1.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.921
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    56.83
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.403
 SUBAREA RUNOFF(CFS) =      0.38
 TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.38

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   116.00
 UPSTREAM ELEVATION(FEET) =    132.00
 DOWNSTREAM ELEVATION(FEET) =    122.70
 ELEVATION DIFFERENCE(FEET) =      9.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.206
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.959
 SUBAREA RUNOFF(CFS) =      0.32
 TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   589.00
 UPSTREAM ELEVATION(FEET) =    135.20
 DOWNSTREAM ELEVATION(FEET) =    115.80
 ELEVATION DIFFERENCE(FEET) =     19.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.221
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
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          THE MAXIMUM OVERLAND FLOW LENGTH =    95.73
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.404
  SUBAREA RUNOFF(CFS) =      4.08
  TOTAL AREA(ACRES) =      1.54   TOTAL RUNOFF(CFS) =      4.08

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.404
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4772
  SUBAREA AREA(ACRES) =    1.14   SUBAREA RUNOFF(CFS) =    2.83
  TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =      6.91
  TC(MIN.) =   7.22

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.404
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4768
  SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.17
  TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =      7.09
  TC(MIN.) =   7.22

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  115.50  DOWNSTREAM ELEVATION(FEET) =  113.70
  STREET LENGTH(FEET) =   111.90   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 25.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.034
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.034

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0230

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   12.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.47
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 STREET FLOW TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   7.88
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.109
 USER-SPECIFIED RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.493
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.61
 TOTAL AREA(ACRES) =       2.9        PEAK FLOW RATE(CFS) =       7.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  12.03
 FLOW VELOCITY(FEET/SEC.) =  2.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     700.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.109
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4904
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.59
 TOTAL AREA(ACRES) =       3.1   TOTAL RUNOFF(CFS) =      7.89
 TC(MIN.) =   7.88

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   515.10
 UPSTREAM ELEVATION(FEET) =    131.90
 DOWNSTREAM ELEVATION(FEET) =    121.70
 ELEVATION DIFFERENCE(FEET) =     10.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.427
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    79.80
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.307
 SUBAREA RUNOFF(CFS) =      5.44
 TOTAL AREA(ACRES) =      1.97   TOTAL RUNOFF(CFS) =      5.44

****************************************************************************
 FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   273.50
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 UPSTREAM ELEVATION(FEET) =     116.10
 DOWNSTREAM ELEVATION(FEET) =    110.00
 ELEVATION DIFFERENCE(FEET) =      6.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.759
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    78.46
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.17
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.17

****************************************************************************
 FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         1.17      4.76        6.850         0.24
 LONGEST FLOWPATH FROM NODE    510.00 TO NODE    515.00 =     273.50 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         5.44      7.43        5.307         1.97
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =     515.10 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1        4.65       4.76        6.850
     2        6.34       7.43        5.307

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.34   Tc(MIN.) =    7.43
 TOTAL AREA(ACRES) =        2.2
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        2.2  TC(MIN.) =      7.43
 PEAK FLOW RATE(CFS)    =       6.34
 *** PEAK FLOW RATE TABLE ***
        Q(CFS)   Tc(MIN.)
 1        4.65       4.76
 2        6.34       7.43
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

3b

50-YEAR STORM EVENTS
PROPOSED CONDITIONS

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          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2006 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 06/01/2005  License ID 1402

                          Analysis prepared by:


 ************************* DESCRIPTION OF STUDY **************************
* LAS MANSIONES DE BONITA     JOB # 312-07-04                           *
* 50 YEAR ANALYSIS - ULTIMATE CONDITIONS                                *
* PREPARED BY MIKE REMENSPERGER  9/6/07                                 *
 *************************************************************************

  FILE NAME: F:\ACAD\312\AES\312HYD2.DAT
  TIME/DATE OF STUDY: 13:36 09/11/2007
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) =  50.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**********************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    72.00
  UPSTREAM ELEVATION(FEET) =    132.00
  DOWNSTREAM ELEVATION(FEET) =    115.00
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 ELEVATION DIFFERENCE(FEET) =     17.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.538
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.66
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   102.00
 UPSTREAM ELEVATION(FEET) =    137.00
 DOWNSTREAM ELEVATION(FEET) =    134.80
 ELEVATION DIFFERENCE(FEET) =      2.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.907
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    86.57
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.097
 SUBAREA RUNOFF(CFS) =      0.57
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.94
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.57
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   8.46
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.878
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4392
 SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.80
 TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.35
 TC(MIN.) =   8.46

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.35
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   8.72
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.785
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4349
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.22
  TOTAL AREA(ACRES) =      0.7   TOTAL RUNOFF(CFS) =      1.54
  TC(MIN.) =   8.72

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.00
  UPSTREAM ELEVATION(FEET) =    136.90
  DOWNSTREAM ELEVATION(FEET) =    135.30
  ELEVATION DIFFERENCE(FEET) =      1.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.625
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    75.17
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.819
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
  ==========================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
```

```
 ESTIMATED PIPE DIAMETER(INCH) =    6.00    NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =        0.47
 PIPE TRAVEL TIME(MIN.) =    0.62    Tc(MIN.) =    9.24
 LONGEST FLOWPATH FROM NODE    220.00 TO NODE    215.00 =     293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.47      9.24         4.608         0.20
 LONGEST FLOWPATH FROM NODE    220.00 TO NODE    215.00 =     293.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.54      8.72         4.785         0.74
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     362.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
    1        1.99       8.72         4.785
    2        1.96       9.24         4.608

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        1.99   Tc(MIN.) =     8.72
 TOTAL AREA(ACRES) =         0.9

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0840
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.46
 ESTIMATED PIPE DIAMETER(INCH) =    9.00    NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =        1.99
 PIPE TRAVEL TIME(MIN.) =    0.03    Tc(MIN.) =    8.75
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   107.00
 UPSTREAM ELEVATION(FEET) =    131.10
 DOWNSTREAM ELEVATION(FEET) =    129.00
 ELEVATION DIFFERENCE(FEET) =      2.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.059
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    84.44
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.035
 SUBAREA RUNOFF(CFS) =      0.57
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.57
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   8.69
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.57      8.69        4.795         0.23
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     293.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.99      8.75        4.775         0.94
    2          1.96      9.27        4.600         0.94
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     381.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF        Tc       INTENSITY
 NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
    1        2.54        8.69        4.795
    2        2.55        8.75        4.775
    3        2.50        9.27        4.600
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.55   Tc(MIN.) =    8.75
 TOTAL AREA(ACRES) =        1.2

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0262
 FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.80
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.55
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   9.01
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    245.00 =     505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.684
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4422
 SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    0.90
 TOTAL AREA(ACRES) =       1.6   TOTAL RUNOFF(CFS) =      3.40
 TC(MIN.) =   9.01
 ** PEAK FLOW RATE TABLE **
 STREAM   RUNOFF       Tc
 NUMBER    (CFS)     (MIN.)
    1        3.41       8.96
    2        3.40       9.01
    3        3.28       9.54
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       3.41  Tc(MIN.) =   8.96

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   111.00
 UPSTREAM ELEVATION(FEET) =    131.20
 DOWNSTREAM ELEVATION(FEET) =    129.00
 ELEVATION DIFFERENCE(FEET) =      2.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.046
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    84.73
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.040
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.74
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.49
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   8.70
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    245.00 =     297.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1         0.49      8.70        4.792         0.20
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    245.00 =     297.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
      1         3.41      8.96        4.703         1.64
      2         3.40      9.01        4.684         1.64
      3         3.28      9.54        4.516         1.64
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    245.00 =     505.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
      1        3.81       8.70        4.792
      2        3.90       8.96        4.703
      3        3.88       9.01        4.684
      4        3.74       9.54        4.516

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.90   Tc(MIN.) =    8.96
  TOTAL AREA(ACRES) =        1.8

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 REPRESENTATIVE SLOPE =  0.0523
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.15
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.90
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   9.12
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =     615.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.648
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4393
 SUBAREA AREA(ACRES) =    0.51   SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =       2.3   TOTAL RUNOFF(CFS) =      4.80
 TC(MIN.) =   9.12
 ** PEAK FLOW RATE TABLE **
 STREAM   RUNOFF       Tc
 NUMBER    (CFS)     (MIN.)
    1        4.89       8.86
    2        4.80       9.12
    3        4.78       9.18
    4        4.61       9.70
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       4.89  Tc(MIN.) =   8.86

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.1250
 FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.61
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.89
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.91
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    265.00 =     656.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    265.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   273.50
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 UPSTREAM ELEVATION(FEET) =     116.10
 DOWNSTREAM ELEVATION(FEET) =    110.00
 ELEVATION DIFFERENCE(FEET) =      6.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.759
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    78.46
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.850
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.85
 TOTAL AREA(ACRES) =      0.38   TOTAL RUNOFF(CFS) =      1.85

****************************************************************************
 FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.85      4.76        6.850         0.38
 LONGEST FLOWPATH FROM NODE    270.00 TO NODE    265.00 =     273.50 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          4.89      8.91        4.721         2.35
    2          4.80      9.16        4.634         2.35
    3          4.78      9.22        4.616         2.35
    4          4.61      9.74        4.454         2.35
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    265.00 =     656.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1         4.46        4.76        6.850
    2         6.16        8.91        4.721
    3         6.05        9.16        4.634
    4         6.02        9.22        4.616
    5         5.81        9.74        4.454

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.16   Tc(MIN.) =     8.91
 TOTAL AREA(ACRES) =        2.7

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
 UPSTREAM ELEVATION(FEET) =    136.00
 DOWNSTREAM ELEVATION(FEET) =    128.00
 ELEVATION DIFFERENCE(FEET) =      8.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.859
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    97.35
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.587
  SUBAREA RUNOFF(CFS) =      0.96
  TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.96

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.96
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   7.27
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =     341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.381
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4764
  SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    0.72
  TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.64
  TC(MIN.) =   7.27

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =    14.60   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.39
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.64
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.31
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
```

```
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  21
 --------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
 UPSTREAM ELEVATION(FEET) =    125.90
 DOWNSTREAM ELEVATION(FEET) =    124.50
 ELEVATION DIFFERENCE(FEET) =      1.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.205
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.412
 SUBAREA RUNOFF(CFS) =      0.27
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.27

**************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    315.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   135.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.01
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.27
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   7.77
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    315.00 =     204.50 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  12
--------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    81.00
 UPSTREAM ELEVATION(FEET) =    126.10
 DOWNSTREAM ELEVATION(FEET) =    124.50
 ELEVATION DIFFERENCE(FEET) =      1.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.876
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.110
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.25
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   201.40   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.97
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.25
 PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   8.72
 LONGEST FLOWPATH FROM NODE    330.00 TO NODE    315.00 =     282.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.25      8.72         4.785         0.10
 LONGEST FLOWPATH FROM NODE    330.00 TO NODE    315.00 =     282.40 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.64      7.31         5.363         0.64
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         1.85       7.31         5.363
    2         1.71       8.72         4.785

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        1.85   Tc(MIN.) =    7.31
 TOTAL AREA(ACRES) =         0.7

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.85      7.31         5.363         0.74
    2          1.71      8.72         4.785         0.74
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
```

```
    1         0.27      7.77        5.156          0.10
  LONGEST FLOWPATH FROM NODE    320.00 TO NODE    315.00 =     204.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF        Tc       INTENSITY
  NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
      1       2.10        7.31         5.363
      2       2.04        7.77         5.156
      3       1.96        8.72         4.785

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.10   Tc(MIN.) =     7.31
  TOTAL AREA(ACRES) =         0.8

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =    27.50   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.10
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   7.38
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     383.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   137.50
  UPSTREAM ELEVATION(FEET) =    135.20
  DOWNSTREAM ELEVATION(FEET) =    129.20
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.601
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.229
  SUBAREA RUNOFF(CFS) =       0.36
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.36
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   178.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   8.28
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     315.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.949
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4666
  SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    0.99
  TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.34
  TC(MIN.) =   8.28

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   207.00
  UPSTREAM ELEVATION(FEET) =    134.10
  DOWNSTREAM ELEVATION(FEET) =    130.00
  ELEVATION DIFFERENCE(FEET) =      4.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.047
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    84.71
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
    50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.040
  SUBAREA RUNOFF(CFS) =      0.81
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      0.81
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    420.00 TO NODE    410.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.24
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.81
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   8.21
 LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =     259.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  11
--------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.81      8.21        4.974         0.33
 LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =     259.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.34      8.28        4.949         0.58
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     315.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         2.14       8.21        4.974
    2         2.15       8.28        4.949

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.15   Tc(MIN.) =    8.28
 TOTAL AREA(ACRES) =        0.9

**************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    425.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    57.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.15
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   8.42
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    425.00 =     373.00 FEET.

**************************************************************************
```

```
 FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.895
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4698
 SUBAREA AREA(ACRES) =     0.08   SUBAREA RUNOFF(CFS) =     0.16
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.28
 TC(MIN.) =   8.42
 ** PEAK FLOW RATE TABLE **
 STREAM   RUNOFF       Tc
 NUMBER    (CFS)     (MIN.)
    1        2.29       8.35
    2        2.28       8.42
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       2.29  Tc(MIN.) =   8.35

**********************************************************************
 FLOW PROCESS FROM NODE    425.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.29
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   8.53
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =     445.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.854
 USER-SPECIFIED RUNOFF COEFFICIENT = .5700
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4837
 SUBAREA AREA(ACRES) =     0.16   SUBAREA RUNOFF(CFS) =     0.44
 TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       2.70
 TC(MIN.) =   8.53

**********************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  11
----------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
======================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          2.70      8.53        4.854         1.15
    2          2.69      8.60        4.830         1.15
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =     445.00 FEET.
```

```
** MEMORY BANK #  1 CONFLUENCE DATA **
STREAM      RUNOFF      Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         2.10      7.38        5.331        0.84
    2         2.04      7.84        5.127        0.84
    3         1.96      8.79        4.760        0.84
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =      383.10 FEET.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF       Tc       INTENSITY
NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         4.44      7.38        5.331
    2         4.53      7.84        5.127
    3         4.64      8.53        4.854
    4         4.61      8.60        4.830
    5         4.61      8.79        4.760

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       4.64   Tc(MIN.) =     8.53
TOTAL AREA(ACRES) =         2.0

****************************************************************************
FLOW PROCESS FROM NODE    340.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
REPRESENTATIVE SLOPE =  0.0200
FLOW LENGTH(FEET) =   134.00   MANNING'S N =  0.011
DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =        4.64
PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    8.80
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =      579.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  10
----------------------------------------------------------------------------
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    435.00 TO NODE    440.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4900
S.C.S. CURVE NUMBER (AMC II) =  85
INITIAL SUBAREA FLOW-LENGTH(FEET) =   214.00
UPSTREAM ELEVATION(FEET) =    129.80
DOWNSTREAM ELEVATION(FEET) =    125.50
ELEVATION DIFFERENCE(FEET) =      4.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.027
```

```
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    85.09
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.048
 SUBAREA RUNOFF(CFS) =      0.69
 TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.69

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.69
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   8.20
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    430.00 =     267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc       INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        0.69     8.20        4.979       0.28
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    430.00 =     267.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF     Tc       INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        4.44     7.65        5.206       1.99
     2        4.53     8.11        5.014       1.99
     3        4.64     8.80        4.757       1.99
     4        4.61     8.87        4.734       1.99
     5        4.61     9.06        4.668       1.99
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     579.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1       5.08       7.65        5.206
     2       5.21       8.11        5.014
     3       5.19       8.20        4.979
     4       5.30       8.80        4.757
     5       5.27       8.87        4.734
     6       5.26       9.06        4.668

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.30   Tc(MIN.) =    8.80
 TOTAL AREA(ACRES) =        2.3

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    430.00 TO NODE    445.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    11.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.37
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.30
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.82
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    445.00 =     590.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    445.00 TO NODE    445.00 IS CODE =  12
----------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
======================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    445.00 TO NODE    445.00 IS CODE =  10
----------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
======================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    450.00 TO NODE    455.00 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   242.00
 UPSTREAM ELEVATION(FEET) =    124.40
 DOWNSTREAM ELEVATION(FEET) =    115.00
 ELEVATION DIFFERENCE(FEET) =      9.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.887
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    97.21
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.572
 SUBAREA RUNOFF(CFS) =      1.39
 TOTAL AREA(ACRES) =      0.51   TOTAL RUNOFF(CFS) =      1.39

****************************************************************************
 FLOW PROCESS FROM NODE    455.00 TO NODE    460.00 IS CODE =  61
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0120
 STREET LENGTH(FEET) =   108.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 25.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.034
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.034
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0230

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.85
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =    7.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   7.87
   50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.112
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.562
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.91
 TOTAL AREA(ACRES) =       0.8       PEAK FLOW RATE(CFS) =       2.18

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =   7.86
 FLOW VELOCITY(FEET/SEC.) =  1.90   DEPTH*VELOCITY(FT*FT/SEC.) =   0.71
 LONGEST FLOWPATH FROM NODE    450.00 TO NODE    460.00 =     350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          2.18      7.87         5.112        0.76
 LONGEST FLOWPATH FROM NODE    450.00 TO NODE    460.00 =     350.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          5.08      7.67         5.196        2.27
    2          5.21      8.13         5.005        2.27
    3          5.19      8.22         4.970        2.27
    4          5.30      8.82         4.749        2.27
    5          5.27      8.89         4.726        2.27
    6          5.26      9.09         4.660        2.27
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     590.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1         7.21        7.67         5.196
    2         7.23        7.87         5.112
    3         7.35        8.13         5.005
    4         7.31        8.22         4.970
    5         7.33        8.82         4.749
    6         7.29        8.89         4.726
    7         7.25        9.09         4.660

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.35   Tc(MIN.) =    8.13
 TOTAL AREA(ACRES) =        3.0
============================================================================
```

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.0 TC(MIN.) = 8.13
PEAK FLOW RATE(CFS) = 7.35

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	7.21	7.67
2	7.23	7.87
3	7.35	8.13
4	7.31	8.22
5	7.33	8.82
6	7.29	8.89
7	7.25	9.09

==========

==========

END OF RATIONAL METHOD ANALYSIS

3c

100-YEAR STORM EVENTS
EXISTING CONDITIONS

```
**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2006 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 06/01/2005  License ID 1402

                          Analysis prepared by:


 ************************** DESCRIPTION OF STUDY **************************
* LAS MANSIONES DE BONITA     JOB # 312-07-04                              *
* 100 YEAR ANALYSIS - EXISTING CONDITIONS                                  *
* PREPARED BY MIKE REMENSPERGER  9/6/07                                    *
 **************************************************************************

  FILE NAME: F:\ACAD\312\AES\312HYD1.DAT
  TIME/DATE OF STUDY: 13:50 09/07/2007
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    94.00
  UPSTREAM ELEVATION(FEET) =    131.90
  DOWNSTREAM ELEVATION(FEET) =    115.00
```

```
 ELEVATION DIFFERENCE(FEET) =     16.90
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.185
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.207
 SUBAREA RUNOFF(CFS) =      1.09
 TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      1.09

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   164.00
 UPSTREAM ELEVATION(FEET) =    131.00
 DOWNSTREAM ELEVATION(FEET) =    129.90
 ELEVATION DIFFERENCE(FEET) =      1.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.921
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    56.83
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.742
 SUBAREA RUNOFF(CFS) =      0.41
 TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   116.00
 UPSTREAM ELEVATION(FEET) =    132.00
 DOWNSTREAM ELEVATION(FEET) =    122.70
 ELEVATION DIFFERENCE(FEET) =      9.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.206
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.418
 SUBAREA RUNOFF(CFS) =      0.34
 TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   589.00
 UPSTREAM ELEVATION(FEET) =    135.20
 DOWNSTREAM ELEVATION(FEET) =    115.80
 ELEVATION DIFFERENCE(FEET) =     19.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.221
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    95.73
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.820
 SUBAREA RUNOFF(CFS) =      4.39
 TOTAL AREA(ACRES) =      1.54   TOTAL RUNOFF(CFS) =      4.39

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.820
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4772
 SUBAREA AREA(ACRES) =    1.14   SUBAREA RUNOFF(CFS) =    3.05
 TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =      7.44
 TC(MIN.) =   7.22

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.820
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4768
 SUBAREA AREA(ACRES) =    0.07   SUBAREA RUNOFF(CFS) =    0.19
 TOTAL AREA(ACRES) =       2.7   TOTAL RUNOFF(CFS) =      7.63
 TC(MIN.) =   7.22

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  115.50  DOWNSTREAM ELEVATION(FEET) =  113.70
 STREET LENGTH(FEET) =   111.90   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 25.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.034
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.034

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0230

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.96
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
        NOTE: STREET FLOW EXCEEDS TOP OF CURB.
        THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
        THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
        THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
   STREET FLOW DEPTH(FEET) =  0.53
   HALFSTREET FLOOD WIDTH(FEET) =   12.45
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.91
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.54
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   7.86
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.509
 USER-SPECIFIED RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =  94
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.493
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.65
 TOTAL AREA(ACRES) =       2.9        PEAK FLOW RATE(CFS) =       7.88

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  12.40
 FLOW VELOCITY(FEET/SEC.) =  2.90   DEPTH*VELOCITY(FT*FT/SEC.) =   1.53
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     700.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.509
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4904
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.63
 TOTAL AREA(ACRES) =       3.1   TOTAL RUNOFF(CFS) =      8.51
 TC(MIN.) =   7.86

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   515.10
 UPSTREAM ELEVATION(FEET) =    131.90
 DOWNSTREAM ELEVATION(FEET) =    121.70
 ELEVATION DIFFERENCE(FEET) =     10.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.427
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    79.80
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.716
 SUBAREA RUNOFF(CFS) =      5.85
 TOTAL AREA(ACRES) =      1.97   TOTAL RUNOFF(CFS) =      5.85

****************************************************************************
 FLOW PROCESS FROM NODE    505.00 TO NODE    505.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   273.50
```

```
 UPSTREAM ELEVATION(FEET) =     116.10
 DOWNSTREAM ELEVATION(FEET) =     110.00
 ELEVATION DIFFERENCE(FEET) =       6.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =     4.759
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    78.46
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.26
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.26

****************************************************************************
 FLOW PROCESS FROM NODE    515.00 TO NODE    515.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.26      4.76        7.377         0.24
 LONGEST FLOWPATH FROM NODE    510.00 TO NODE    515.00 =     273.50 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          5.85      7.43        5.716         1.97
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =     515.10 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         5.01       4.76         7.377
    2         6.83       7.43         5.716

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.83   Tc(MIN.) =     7.43
 TOTAL AREA(ACRES) =        2.2
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =         2.2  TC(MIN.) =       7.43
 PEAK FLOW RATE(CFS)    =        6.83
 *** PEAK FLOW RATE TABLE ***
        Q(CFS)   Tc(MIN.)
 1        5.01       4.76
 2        6.83       7.43
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

3d

100-YEAR STORM EVENTS
PROPOSED CONDITIONS

```
**************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2006 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 06/01/2005  License ID 1402

                          Analysis prepared by:


 ************************** DESCRIPTION OF STUDY **************************
* LAS MANSIONES DE BONITA     JOB # 312-07-04                              *
* 100 YEAR ANALYSIS - ULTIMATE CONDITIONS                                  *
* PREPARED BY MIKE REMENSPERGER  9/6/07                                    *
 **************************************************************************

  FILE NAME: F:\ACAD\312\AES\312HYD2.DAT
  TIME/DATE OF STUDY: 13:35 09/11/2007
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-   CROWN TO    STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH   CROSSFALL   IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)     SIDE / SIDE/ WAY     (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  ================   ======  =====  ======  =====  =======
  1   30.0      20.0    0.018/0.018/0.020   0.67    2.00  0.0313  0.167  0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =  84
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    72.00
  UPSTREAM ELEVATION(FEET) =    132.00
  DOWNSTREAM ELEVATION(FEET) =    115.00
```

```
  ELEVATION DIFFERENCE(FEET) =     17.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.538
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   102.00
  UPSTREAM ELEVATION(FEET) =    137.00
  DOWNSTREAM ELEVATION(FEET) =    134.80
  ELEVATION DIFFERENCE(FEET) =      2.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.907
  WARNING:  INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    86.57
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.489
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.00
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.62
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   8.46
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =     267.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.256
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4392
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.86
  TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.45
  TC(MIN.) =   8.46

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.45
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   8.71
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.156
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  82
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4349
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.23
  TOTAL AREA(ACRES) =       0.7   TOTAL RUNOFF(CFS) =      1.66
  TC(MIN.) =   8.71

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  USER-SPECIFIED RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  85
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   119.00
  UPSTREAM ELEVATION(FEET) =    136.90
  DOWNSTREAM ELEVATION(FEET) =    135.30
  ELEVATION DIFFERENCE(FEET) =      1.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.625
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    75.17
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.190
  SUBAREA RUNOFF(CFS) =      0.51
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.51

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.78
```

```
 ESTIMATED PIPE DIAMETER(INCH) =    6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        0.51
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   9.23
 LONGEST FLOWPATH FROM NODE    220.00 TO NODE    215.00 =     293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.51      9.23        4.967         0.20
 LONGEST FLOWPATH FROM NODE    220.00 TO NODE    215.00 =     293.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.66      8.71        5.156         0.74
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    215.00 =     362.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1         2.14        8.71         5.156
    2         2.11        9.23         4.967

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        2.14   Tc(MIN.) =    8.71
 TOTAL AREA(ACRES) =         0.9

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0840
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.69
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        2.14
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   8.74
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   107.00
 UPSTREAM ELEVATION(FEET) =    131.10
 DOWNSTREAM ELEVATION(FEET) =    129.00
 ELEVATION DIFFERENCE(FEET) =      2.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.059
 WARNING:  INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    84.44
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.422
 SUBAREA RUNOFF(CFS) =      0.61
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.61

****************************************************************************
 FLOW PROCESS FROM NODE    240.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.61
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   8.68
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    230.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         0.61      8.68        5.168         0.23
 LONGEST FLOWPATH FROM NODE    235.00 TO NODE    230.00 =     293.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1         2.14      8.74        5.146         0.94
     2         2.11      9.26        4.958         0.94
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    230.00 =     381.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1        2.74        8.68        5.168
     2        2.75        8.74        5.146
     3        2.69        9.26        4.958
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.75   Tc(MIN.) =     8.74
 TOTAL AREA(ACRES) =        1.2

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0262
 FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.89
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.75
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    9.00
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    245.00 =     505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.049
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4422
 SUBAREA AREA(ACRES) =    0.47   SUBAREA RUNOFF(CFS) =    0.97
 TOTAL AREA(ACRES) =       1.6   TOTAL RUNOFF(CFS) =      3.66
 TC(MIN.) =   9.00
 ** PEAK FLOW RATE TABLE **
 STREAM   RUNOFF       Tc
 NUMBER    (CFS)     (MIN.)
    1        3.68       8.94
    2        3.66       9.00
    3        3.53       9.52
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       3.68  Tc(MIN.) =    8.94

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   111.00
 UPSTREAM ELEVATION(FEET) =    131.20
 DOWNSTREAM ELEVATION(FEET) =    129.00
 ELEVATION DIFFERENCE(FEET) =      2.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.046
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    84.73
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.428
 SUBAREA RUNOFF(CFS) =      0.53
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
 FLOW PROCESS FROM NODE    255.00 TO NODE    245.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.53
 PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   8.69
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    245.00 =     297.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF     Tc       INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1         0.53     8.69        5.167        0.20
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE    245.00 =     297.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF     Tc       INTENSITY     AREA
 NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
    1         3.68     8.94        5.070        1.64
    2         3.66     9.00        5.049        1.64
    3         3.53     9.52        4.869        1.64
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    245.00 =     505.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1        4.10       8.69        5.167
    2        4.20       8.94        5.070
    3        4.18       9.00        5.049
    4        4.03       9.52        4.869

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.20   Tc(MIN.) =    8.94
 TOTAL AREA(ACRES) =       1.8

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    260.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 REPRESENTATIVE SLOPE =  0.0523
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.24
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.20
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   9.11
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    260.00 =     615.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.011
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4393
 SUBAREA AREA(ACRES) =    0.51   SUBAREA RUNOFF(CFS) =    1.05
 TOTAL AREA(ACRES) =       2.3   TOTAL RUNOFF(CFS) =      5.17
 TC(MIN.) =   9.11
 ** PEAK FLOW RATE TABLE **
 STREAM   RUNOFF       Tc
 NUMBER    (CFS)     (MIN.)
    1        5.27       8.85
    2        5.17       9.11
    3        5.15       9.16
    4        4.97       9.69
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       5.27  Tc(MIN.) =   8.85

****************************************************************************
 FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.1250
 FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.87
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.27
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   8.89
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    265.00 =     656.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    270.00 TO NODE    265.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   273.50
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 UPSTREAM ELEVATION(FEET) =     116.10
 DOWNSTREAM ELEVATION(FEET) =    110.00
 ELEVATION DIFFERENCE(FEET) =      6.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.759
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    78.46
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.99
 TOTAL AREA(ACRES) =      0.38   TOTAL RUNOFF(CFS) =      1.99

****************************************************************************
 FLOW PROCESS FROM NODE    265.00 TO NODE    265.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.99      4.76        7.377         0.38
 LONGEST FLOWPATH FROM NODE    270.00 TO NODE    265.00 =     273.50 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          5.27      8.89        5.090         2.35
    2          5.17      9.15        4.997         2.35
    3          5.15      9.21        4.977         2.35
    4          4.97      9.73        4.803         2.35
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    265.00 =     656.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
    1         4.81        4.76        7.377
    2         6.64        8.89        5.090
    3         6.52        9.15        4.997
    4         6.49        9.21        4.977
    5         6.27        9.73        4.803

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.64   Tc(MIN.) =     8.89
 TOTAL AREA(ACRES) =        2.7

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.00
 UPSTREAM ELEVATION(FEET) =    136.00
 DOWNSTREAM ELEVATION(FEET) =    128.00
 ELEVATION DIFFERENCE(FEET) =      8.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.859
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

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          THE MAXIMUM OVERLAND FLOW LENGTH =    97.35
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.016
 SUBAREA RUNOFF(CFS) =      1.03
 TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      1.03

****************************************************************************
 FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.03
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   7.26
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =     341.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.799
 USER-SPECIFIED RUNOFF COEFFICIENT = .4600
 S.C.S. CURVE NUMBER (AMC II) =  84
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4764
 SUBAREA AREA(ACRES) =    0.29   SUBAREA RUNOFF(CFS) =    0.77
 TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.77
 TC(MIN.) =   7.26

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    14.60   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      1.77
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   7.30
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
```

```
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    69.00
 UPSTREAM ELEVATION(FEET) =    125.90
 DOWNSTREAM ELEVATION(FEET) =    124.50
 ELEVATION DIFFERENCE(FEET) =      1.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.205
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.829
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

**************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    315.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   135.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      0.29
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   7.75
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    315.00 =     204.50 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  12
--------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    335.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    81.00
 UPSTREAM ELEVATION(FEET) =    126.10
 DOWNSTREAM ELEVATION(FEET) =    124.50
 ELEVATION DIFFERENCE(FEET) =      1.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.876
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.503
 SUBAREA RUNOFF(CFS) =      0.27
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.27
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    315.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   201.40   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.27
 PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   8.70
 LONGEST FLOWPATH FROM NODE    330.00 TO NODE    315.00 =     282.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          0.27      8.70        5.161         0.10
 LONGEST FLOWPATH FROM NODE    330.00 TO NODE    315.00 =     282.40 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.77      7.30        5.779         0.64
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         1.99       7.30        5.779
    2         1.85       8.70        5.161

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       1.99   Tc(MIN.) =    7.30
 TOTAL AREA(ACRES) =        0.7

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    315.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          1.99      7.30        5.779         0.74
    2          1.85      8.70        5.161         0.74
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    315.00 =     355.60 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
```

```
    1         0.29      7.75        5.559         0.10
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    315.00 =     204.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF        Tc       INTENSITY
 NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1        2.26        7.30         5.779
     2        2.20        7.75         5.559
     3        2.11        8.70         5.161

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        2.26   Tc(MIN.) =     7.30
 TOTAL AREA(ACRES) =         0.8

****************************************************************************
 FLOW PROCESS FROM NODE    315.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    27.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        2.26
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   7.37
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     383.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   137.50
 UPSTREAM ELEVATION(FEET) =    135.20
 DOWNSTREAM ELEVATION(FEET) =    129.20
 ELEVATION DIFFERENCE(FEET) =      6.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.601
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.631
 SUBAREA RUNOFF(CFS) =      0.39
 TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.39
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =   178.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.48
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.39
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   8.26
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     315.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.336
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4666
 SUBAREA AREA(ACRES) =    0.41   SUBAREA RUNOFF(CFS) =    1.07
 TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =      1.44
 TC(MIN.) =   8.26

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    415.00 TO NODE    420.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   207.00
 UPSTREAM ELEVATION(FEET) =    134.10
 DOWNSTREAM ELEVATION(FEET) =    130.00
 ELEVATION DIFFERENCE(FEET) =      4.10
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.047
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    84.71
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.427
 SUBAREA RUNOFF(CFS) =      0.88
 TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      0.88
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    420.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.88
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   8.21
 LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =     259.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         0.88      8.21        5.358         0.33
 LONGEST FLOWPATH FROM NODE    415.00 TO NODE    410.00 =     259.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         1.44      8.26        5.336         0.58
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     315.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
    1        2.31       8.21        5.358
    2        2.32       8.26        5.336

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.32   Tc(MIN.) =    8.26
 TOTAL AREA(ACRES) =        0.9

****************************************************************************
 FLOW PROCESS FROM NODE    410.00 TO NODE    425.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    57.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.32
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   8.40
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    425.00 =     373.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    425.00 TO NODE    425.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.278
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4698
 SUBAREA AREA(ACRES) =     0.08   SUBAREA RUNOFF(CFS) =     0.17
 TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.45
 TC(MIN.) =   8.40

**********************************************************************
 FLOW PROCESS FROM NODE    425.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.92
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.45
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   8.58
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =     445.00 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.209
 USER-SPECIFIED RUNOFF COEFFICIENT = .5700
 S.C.S. CURVE NUMBER (AMC II) =  87
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4837
 SUBAREA AREA(ACRES) =     0.16   SUBAREA RUNOFF(CFS) =     0.48
 TOTAL AREA(ACRES) =        1.1   TOTAL RUNOFF(CFS) =       2.90
 TC(MIN.) =   8.58
 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc
 NUMBER     (CFS)     (MIN.)
    1        2.91       8.52
    2        2.90       8.58
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =       2.91  Tc(MIN.) =   8.52

**********************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  11
----------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
======================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         2.91      8.52        5.230         1.15
    2         2.90      8.58        5.209         1.15
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =     445.00 FEET.
```

```
** MEMORY BANK #  1 CONFLUENCE DATA **
STREAM      RUNOFF      Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1         2.26      7.37        5.745         0.84
    2         2.20      7.82        5.529         0.84
    3         2.11      8.77        5.135         0.84
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    340.00 =     383.10 FEET.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF       Tc       INTENSITY
NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         4.78      7.37        5.745
    2         4.87      7.82        5.529
    3         4.99      8.52        5.230
    4         4.97      8.58        5.209
    5         4.97      8.77        5.135

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       4.99   Tc(MIN.) =     8.52
TOTAL AREA(ACRES) =        2.0

****************************************************************************
FLOW PROCESS FROM NODE    340.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
REPRESENTATIVE SLOPE =  0.0200
FLOW LENGTH(FEET) =   134.00   MANNING'S N =  0.011
DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.30
ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       4.99
PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   8.79
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     579.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  10
----------------------------------------------------------------------------
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    435.00 TO NODE    440.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
USER-SPECIFIED RUNOFF COEFFICIENT = .4900
S.C.S. CURVE NUMBER (AMC II) =  85
INITIAL SUBAREA FLOW-LENGTH(FEET) =   214.00
UPSTREAM ELEVATION(FEET) =    129.80
DOWNSTREAM ELEVATION(FEET) =    125.50
ELEVATION DIFFERENCE(FEET) =      4.30
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.027
```

```
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    85.09
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.436
 SUBAREA RUNOFF(CFS) =      0.75
 TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.75

****************************************************************************
 FLOW PROCESS FROM NODE    440.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.22
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.75
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   8.20
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    430.00 =     267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        0.75      8.20        5.364         0.28
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    430.00 =     267.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1        4.78      7.64        5.613         1.99
     2        4.87      8.09        5.409         1.99
     3        4.99      8.79        5.126         1.99
     4        4.97      8.85        5.106         1.99
     5        4.97      9.04        5.036         1.99
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    430.00 =     579.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
     1        5.47       7.64        5.613
     2        5.61       8.09        5.409
     3        5.58       8.20        5.364
     4        5.71       8.79        5.126
     5        5.68       8.85        5.106
     6        5.67       9.04        5.036

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       5.71   Tc(MIN.) =    8.79
 TOTAL AREA(ACRES) =        2.3

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    430.00 TO NODE    445.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ======================================================================
 REPRESENTATIVE SLOPE =  0.0200
 FLOW LENGTH(FEET) =    11.50   MANNING'S N =  0.011
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.71
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   8.82
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    445.00 =     590.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    445.00 TO NODE    445.00 IS CODE =  12
----------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    445.00 TO NODE    445.00 IS CODE =  10
----------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    450.00 TO NODE    455.00 IS CODE =  21
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ======================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4900
 S.C.S. CURVE NUMBER (AMC II) =  85
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   242.00
 UPSTREAM ELEVATION(FEET) =    124.40
 DOWNSTREAM ELEVATION(FEET) =    115.00
 ELEVATION DIFFERENCE(FEET) =      9.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.887
 WARNING:  INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    97.21
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.001
 SUBAREA RUNOFF(CFS) =      1.50
 TOTAL AREA(ACRES) =      0.51   TOTAL RUNOFF(CFS) =      1.50

****************************************************************************
 FLOW PROCESS FROM NODE    455.00 TO NODE    460.00 IS CODE =  61
----------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
 ======================================================================
 REPRESENTATIVE SLOPE =  0.0120
 STREET LENGTH(FEET) =   108.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 25.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.034
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.034
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0230

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.99
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =    7.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
 STREET FLOW TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   7.85
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.513
 USER-SPECIFIED RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =  92
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.562
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.98
 TOTAL AREA(ACRES) =       0.8       PEAK FLOW RATE(CFS) =       2.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =   8.09
 FLOW VELOCITY(FEET/SEC.) =  1.94   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
 LONGEST FLOWPATH FROM NODE    450.00 TO NODE    460.00 =     350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    460.00 TO NODE    460.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          2.36      7.85        5.513         0.76
 LONGEST FLOWPATH FROM NODE    450.00 TO NODE    460.00 =     350.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1          5.47      7.66        5.602         2.27
    2          5.61      8.11        5.399         2.27
    3          5.58      8.22        5.354         2.27
    4          5.71      8.82        5.118         2.27
    5          5.68      8.87        5.098         2.27
    6          5.67      9.06        5.028         2.27
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    460.00 =     590.50 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc       INTENSITY
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
    1         7.77       7.66        5.602
    2         7.79       7.85        5.513
    3         7.92       8.11        5.399
    4         7.87       8.22        5.354
    5         7.89       8.82        5.118
    6         7.86       8.87        5.098
    7         7.82       9.06        5.028

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.92   Tc(MIN.) =    8.11
 TOTAL AREA(ACRES) =       3.0
============================================================================
```

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.0 TC(MIN.) = 8.11
PEAK FLOW RATE(CFS) = 7.92

*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	7.77	7.66
2	7.79	7.85
3	7.92	8.11
4	7.87	8.22
5	7.89	8.82
6	7.86	8.87
7	7.82	9.06

==========

==========

END OF RATIONAL METHOD ANALYSIS

APPENDIX 4

SECTION 2.3 COUNTY OF SAN DIEGO HYDROLOGY MANUAL

2.3 Selection of Hydrologic Method and Design Criteria

Design Frequency – The flood frequency for determining the design storm discharge is 50 years for drainage that is upstream of any major roadway and 100 years frequency for all design storms at a major roadway, crossing the major roadway and thereafter. The 50-year storm flows shall be contained within the pipe and not encroach into the travel lane. For the 100-year storm this includes allowing one lane of a four-lane road (four or more lanes) to be used for conveyance without encroaching onto private property outside the dedicated street right-of-way. Natural channels that remain natural within private property are excluded from the right-of-way guideline.

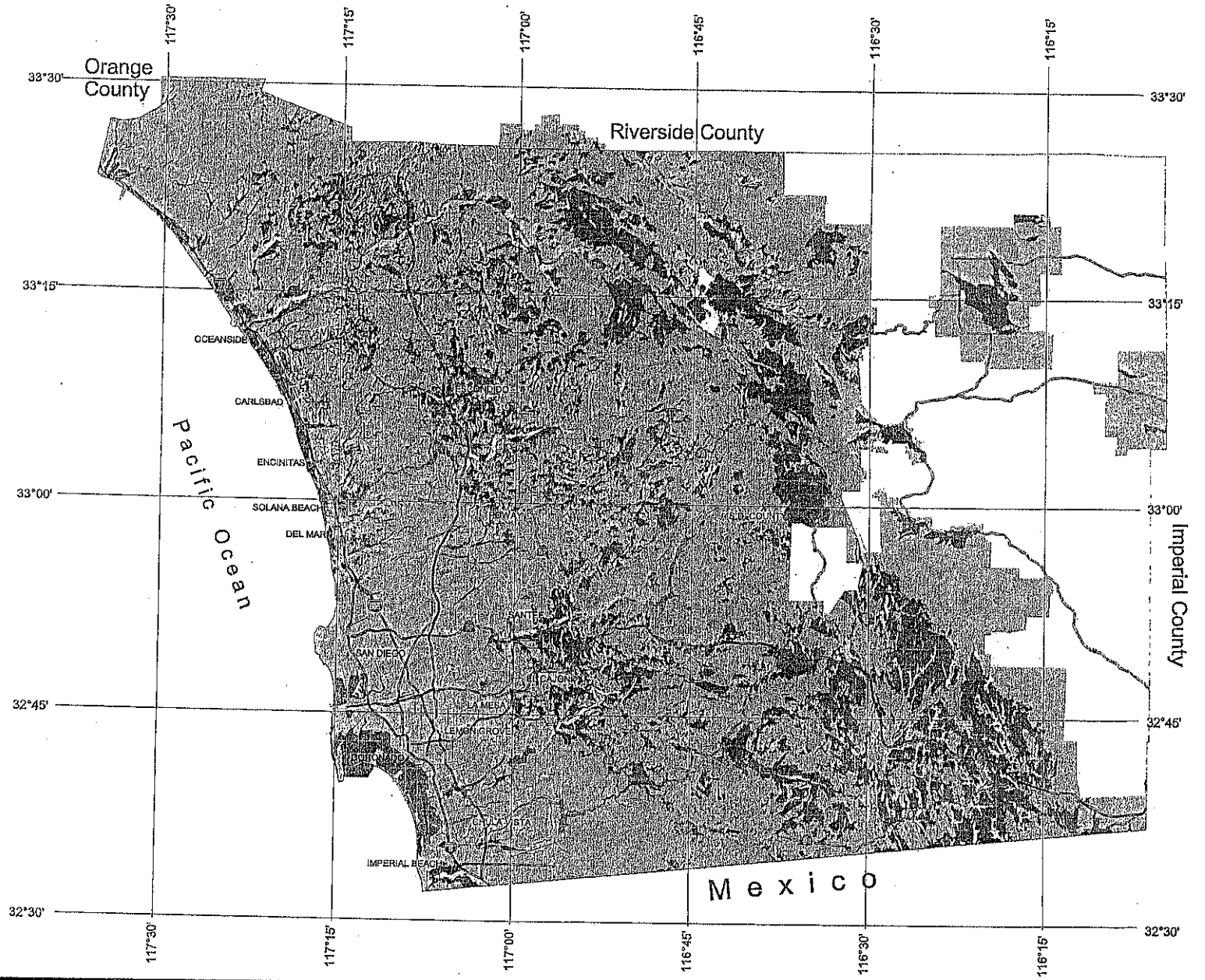
Design Method – The choice of method to determine flows (discharge) shall be based on the size of the watershed area. For an area 0 to approximately 1 square mile the Rational Method or the Modified Rational Method shall be used. For watershed areas larger than 1 square mile the NRCS hydrologic method shall be used. Please check with the governing agency for any variations to these guidelines.

APPENDIX 5

COUNTY OF SAN DIEGO
SOIL HYDROLOGIC GROUPS MAP

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

DPW GIS
Department of Public Works Geographic Information Services

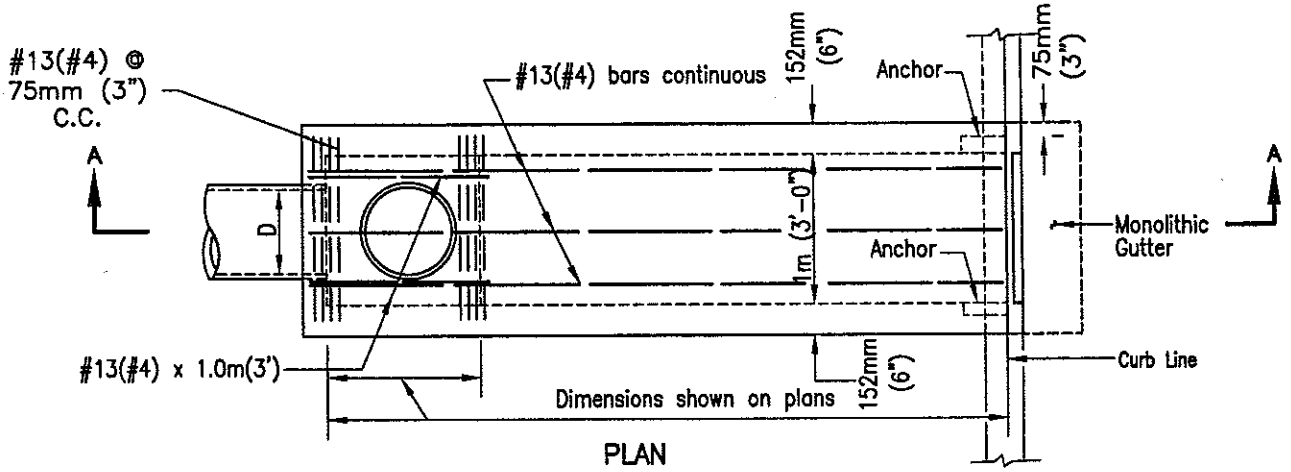
SanGIS
We Have San Diego Covered!

N
W E
S

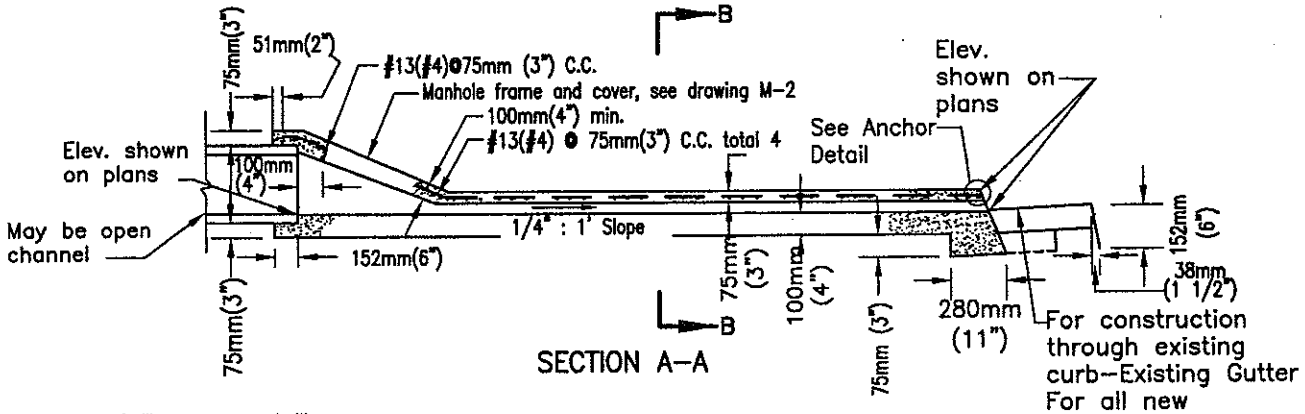
3 0 3 Miles

APPENDIX 6

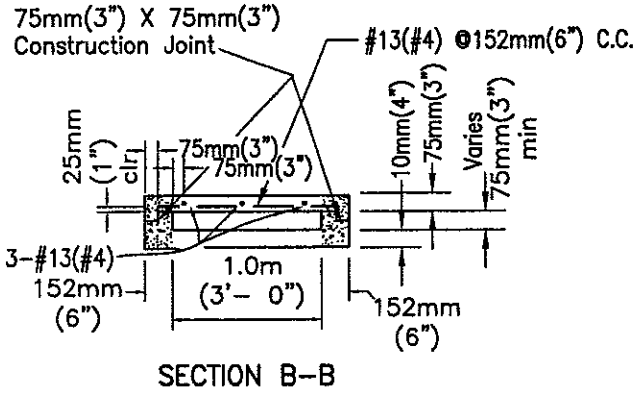
STANDARD DRAWING CURB OUTLET D-25



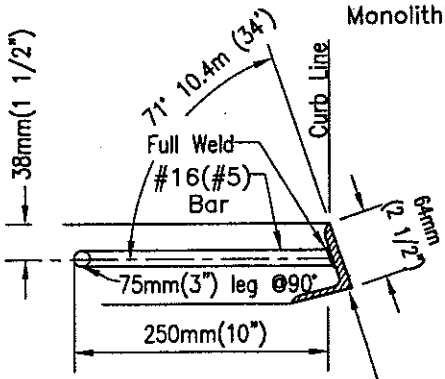
PLAN



SECTION A–A



SECTION B–B

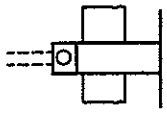


ANCHOR DETAIL

NOTES

1. Concrete shall be 332 kg/M³ –C–22Mpa (560–C–3250)
2. D=inside diameter of pipe or depth of channel.
3. Section to be sloped laterally with top conforming to the grades of the existing sidewalk and curb.
4. Manhole frame and cover may be deleted with open channel.
5. Trowel finish top surface and reproduce markings of existing sidewalk and curb.
6. Trowel finish floor of outlet.

LEGEND ON PLANS



Revision	By	Approved	Date
ORIGINAL		Kercheval	12/75
Metric		T.Stanton	03/03
Reformatted		T.Stanton	04/06

SAN DIEGO REGIONAL STANDARD DRAWING

CURB OUTLET - TYPE A

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

T.A. Stanton 3/01/2003

Chairperson R.C.E. 19245 Date

DRAWING NUMBER **D-25**

APPENDIX 7

CURB OUTLET D-25 SIZING CALCULATIONS

APPENDIX 7a

50 YEAR CALCULATIONS

D-25 CURB OUTLET CALCULATIONS
LAS MANSIONES DE BONITA
50 YEAR ANALYSIS
9/7/07

****

>>>>CHANNEL INPUT INFORMATION<<<<

CHANNEL Z1(HORIZONTAL/VERTICAL) = 0.00
Z2(HORIZONTAL/VERTICAL) = 0.00
BASEWIDTH(FEET) = 6.00
CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
UNIFORM FLOW(CFS) = 5.30
MANNINGS FRICTION FACTOR = 0.0130

==========

NORMAL-DEPTH FLOW INFORMATION:

>>>>> NORMAL DEPTH(FEET) = 0.18
FLOW TOP-WIDTH(FEET) = 6.00
FLOW AREA(SQUARE FEET) = 1.06
HYDRAULIC DEPTH(FEET) = 0.18
FLOW AVERAGE VELOCITY(FEET/SEC.) = 4.98
UNIFORM FROUDE NUMBER = 2.084
PRESSURE + MOMENTUM(POUNDS) = 57.04
AVERAGED VELOCITY HEAD(FEET) = 0.385
SPECIFIC ENERGY(FEET) = 0.562

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL FLOW TOP-WIDTH(FEET) = 6.00
CRITICAL FLOW AREA(SQUARE FEET) = 1.74
CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.29
CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) = 3.05
CRITICAL DEPTH(FEET) = 0.29
CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 47.03
AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) = 0.144
CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.434

==========

APPENDIX 7b

100 YEAR CALCULATIONS

D-25 CURB OUTLET CALCULATIONS
LAS MANSIONES DE BONITA
100 YEAR ANALYSIS
9/7/07

****

>>>>CHANNEL INPUT INFORMATION<<<<

CHANNEL Z1(HORIZONTAL/VERTICAL) = 0.00
Z2(HORIZONTAL/VERTICAL) = 0.00
BASEWIDTH(FEET) = 6.00
CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
UNIFORM FLOW(CFS) = 5.71
MANNINGS FRICTION FACTOR = 0.0130

==========

NORMAL-DEPTH FLOW INFORMATION:

>>>>> NORMAL DEPTH(FEET) = 0.19
FLOW TOP-WIDTH(FEET) = 6.00
FLOW AREA(SQUARE FEET) = 1.13
HYDRAULIC DEPTH(FEET) = 0.19
FLOW AVERAGE VELOCITY(FEET/SEC.) = 5.04
UNIFORM FROUDE NUMBER = 2.044
PRESSURE + MOMENTUM(POUNDS) = 62.44
AVERAGED VELOCITY HEAD(FEET) = 0.394
SPECIFIC ENERGY(FEET) = 0.583

==========

CRITICAL-DEPTH FLOW INFORMATION:

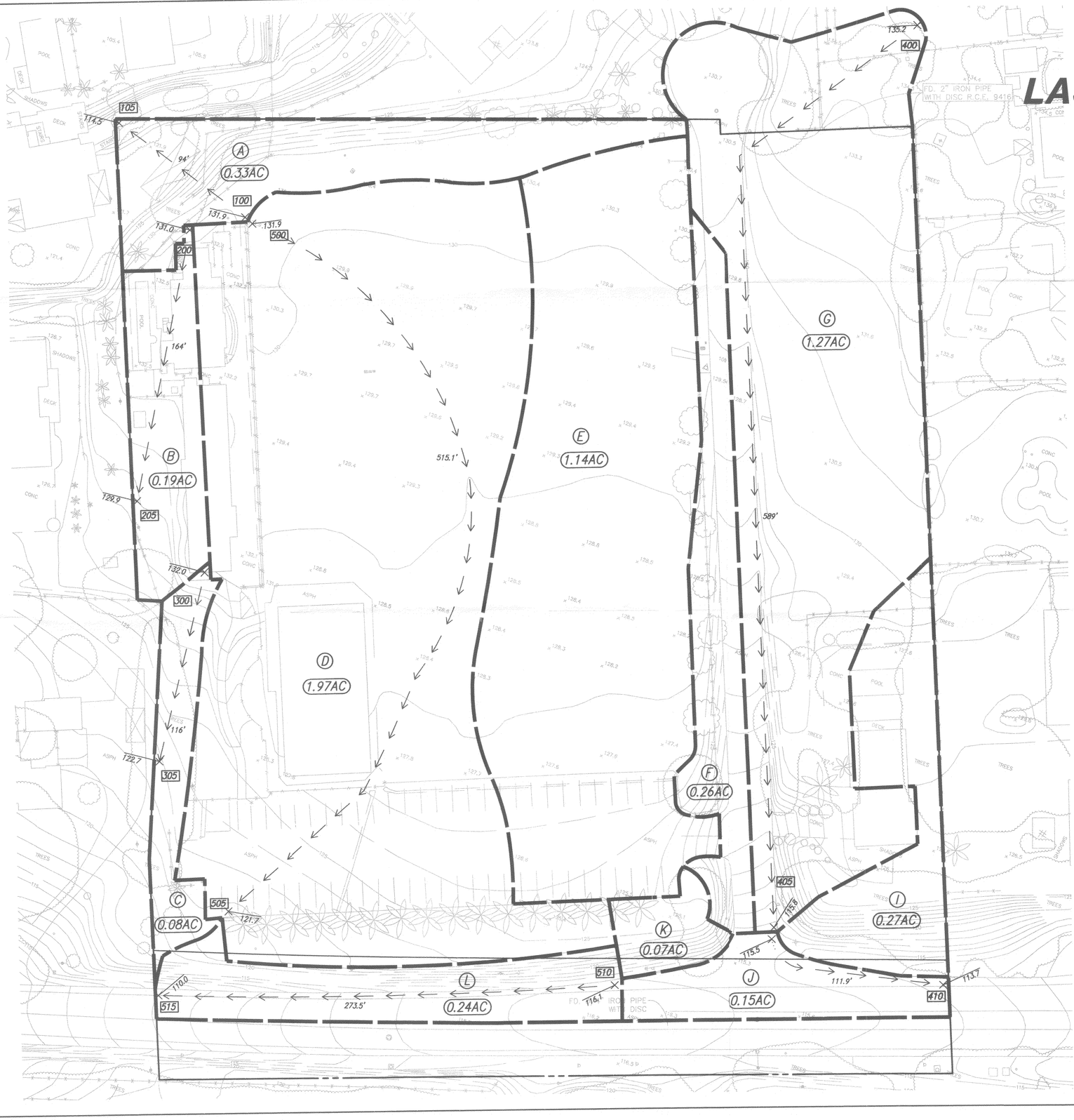
CRITICAL FLOW TOP-WIDTH(FEET) = 6.00
CRITICAL FLOW AREA(SQUARE FEET) = 1.82
CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.30
CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) = 3.13
CRITICAL DEPTH(FEET) = 0.30
CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 51.94
AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) = 0.152
CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.456

==========

LAS MANSIONES DE BONITA

DRAINAGE STUDY

EXISTING CONDITIONS



LEGEND

RATIONAL METHOD NODE NUMBER	107
DRAINAGE BASIN BOUNDARY (EXISTING)	
DRAINAGE BASIN SUB-AREA	0.33AC
DRAINAGE BASIN SUB-AREA NAME	D
DRAINAGE SWALE	
DIRECTION OF FLOW	
SPOT ELEVATION	116.0

SCALE: 1" = 30'

30 15 0 30 60

SCALE IN FEET

DRAINAGE STUDY
EXISTING CONDITIONS

REGISTERED PROFESSIONAL ENGINEER
MARTIAN G. FAUL
No. 34618
Exp 9-30-09
CIVIL
STATE OF CALIFORNIA

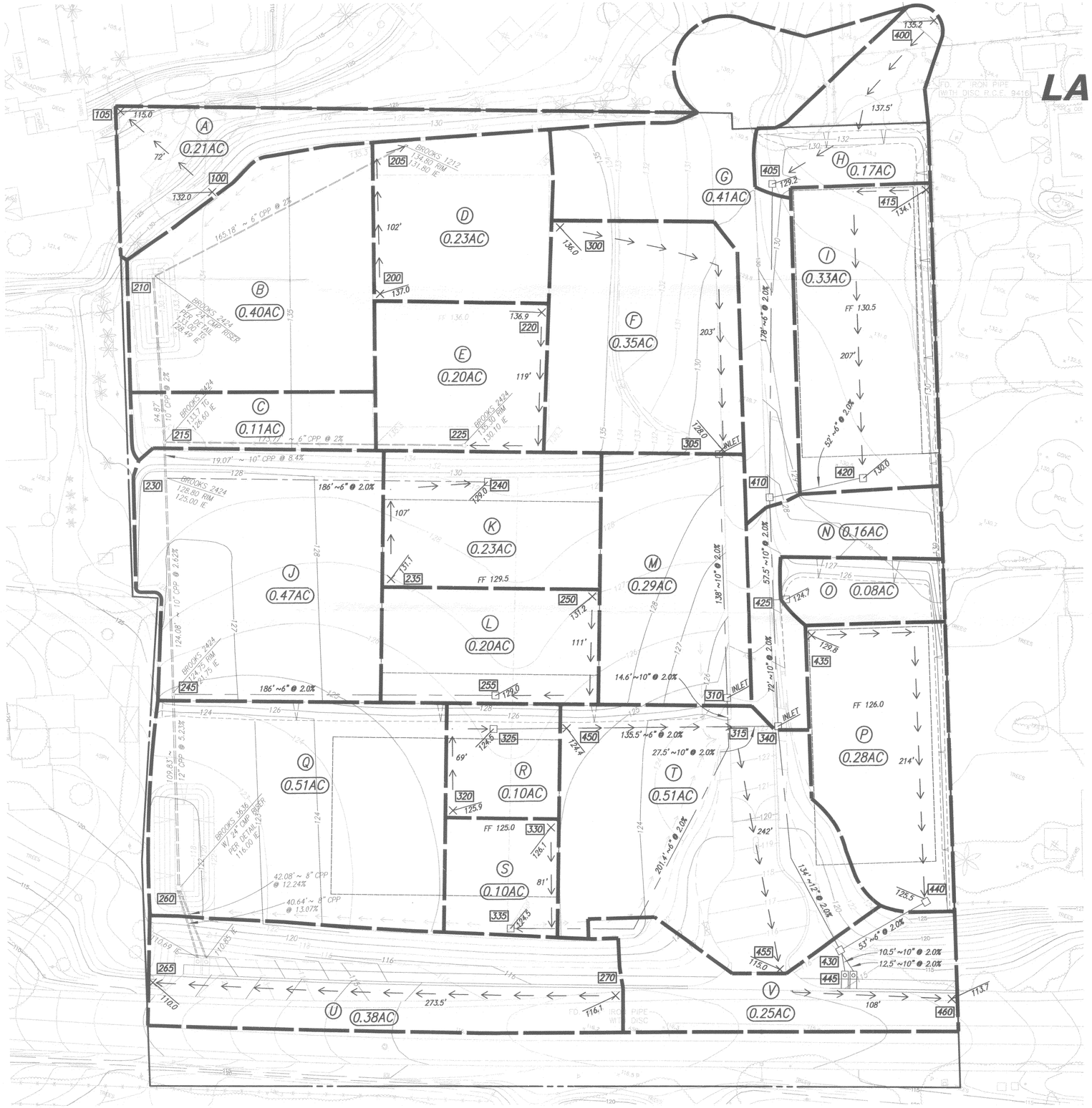
STUART ENGINEERING
7525 METROPOLITAN DRIVE STE. 308
SAN DIEGO, CA 92108 (619) 296-1010
FAX (619) 296-9276 SE@stuartengineering.com

DESIGNER:	NH
DRAWN:	MJR
DATE:	9/7/07
JOB NO.:	312-07-04

LAS MANSIONES DE BONITA

DRAINAGE STUDY

ULTIMATE CONDITIONS



LEGEND

RATIONAL METHOD NODE NUMBER	107
DRAINAGE BASIN BOUNDARY (EXISTING)	
DRAINAGE BASIN SUB-AREA	0.33AC
DRAINAGE BASIN SUB-AREA NAME	D
DRAINAGE SWALE	
DIRECTION OF FLOW	
SPOT ELEVATION	116.0

SCALE: 1"=30'

30 15 0 30 60

SCALE IN FEET

DRAINAGE STUDY
PROPOSED CONDITIONS

REGISTERED PROFESSIONAL ENGINEER
NAN G. STUART
No. 34618
Exp 9-30-09
CIVIL
STATE OF CALIFORNIA

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7525 METROPOLITAN DRIVE STE. 308
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